# COMPACT HIGH POWER RELAY
# 1 POLE - 25A (FOR AUTOMOTIVE APPLICATIONS)

# FBR51 Latching Series

**RoHS Compliant**

## ■ FEATURES

- Magnetically latched PCB relay
- Increased ambient temperature range up to 125ºC
- Two coils with set and reset function
- Reflow soldering capable
- Two types of contact materials
- RoHS compliant




## ■ APPLICATIONS

Dark current cut

## ■ PART NUMBERS

[Example] FBR51 N D 2 10 - W1 - RW
(a) (b) (c) (d) (e) (f) (g)

| | | |
|---|---|---|
| (a) | Relay type | FBR51 series |
| (b) | Enclosure | N : Plastic sealed type |
| (c) | Operating function | L : Latching type |
| (d) | Coil type | 2 : Double coil |
| (e) | Coil rated voltage | 10 : 10VDC |
| (f) | Contact material | W1 : $AgSnO_2In$<br>E : AgNi |
| (g) | Mounting process | Nil : Standard<br>RW : Through hole reflow (THR) |

* E (AgNi) versions used for special low current applications that require lower contact resistance (dark current applications)

Actual markings does not carry the type name: "FBR“
E.g.: Ordering code: FBR51NL210-W1-RW Actual marking: 51NL210-W1-RW

## ■ SPECIFICATIONS

| Item | | | Specifications | | Remarks/Conditions |
|---|---|---|---|---|---|
| | | | W1 contact | E contact | |
| Contact Data | Configuration | | 1 Form C | | |
| | Material | | $AgSnO_2In$ | AgNi | |
| | Voltage drop | | Max. 100mV at 1A, 12VDC | Max. 100mV at 2A, 12VDC | |
| | Contact rating | | 25A at 14VDC | | Locked motor load |
| | Max. carrying current | | 30A / 1 hour | | 25ºC, 100% rated coil voltage |
| | Max. switching voltage | | 16VDC | | Reference |
| | Max. switching current | | 35A | | Reference |
| | Min. switching load * | | 1A, 6VDC | 0.1A, 5VDC | Reference |
| Coil | Operating ambient temperature range | | -40ºC to +125ºC | | No frost |
| Timing data | Set / reset | | Max. 5ms (without bounce) | | At nominal voltage |
| Life | Mechanical | | Min. 1 x $10^6$ operations | | |
| | Electrical (resistive) | | Min. 200 x $10^3$ operations | Min. 50 x $10^3$ operations | 25A, 14VDC, Locked motor load |
| Insulation ** | Insulation resistance | | Min. 100MΩ | | At 500VDC |
| | Dielectric withstanding voltage | Open contacts | 500VAC (50/60Hz), 1 minute | | |
| | | Coil to contacts | 500VAC (50/60Hz), 1 minute | | |
| Others | Vibration resistance | Misoperation | 10 to 200Hz, acceleration 44m/$s^2$ (4.5G) maximum | | |
| | | Endurance | 10 to 200Hz, acceleration 44m/$s^2$ (4.5G) maximum | | |
| | Shock resistance | Misoperation | 100m/s² (11±1ms) | | |
| | | Endurance | 1,000m/s² (6±1ms) | | |
| | Dimensions / Weight | | 12.1 x15.5x13.7 mm / approx. 6g | | |
| | Sealing | | Plastic sealed RT III | | |

* : Minimum switching loads mentioned above are reference values. Please perform the confirmation test with actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels.
Care shall be taken on the heat generated on PC board when maximum carrying current exceeds 10A. Please perform the confirmation test with actual conditions.

** : Values of insulation are under 20°C± 15°C, 65±20%.

## ■ COIL DATA

| Coil Code | Coil Resistance ±10% (Ω) | Set Voltage*1 (VDC) | Reset Voltage*1 (VDC) |
|---|---|---|---|
| 10 | P90 | +6.3 (20ºC)<br>+8.9 (125ºC) | - |
| | S90 | - | +6.3 (20°C)<br>+8.9(125°C) |

P: Set coil
S: Reset coil

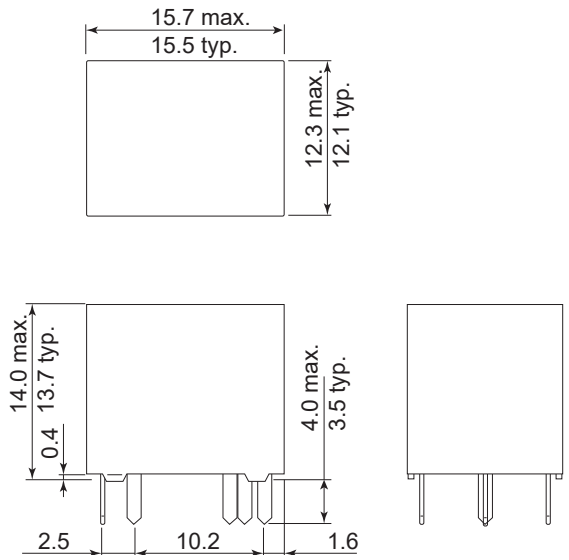
Note: All values in the table are valid at 20°C and zero contact current, unless otherwise specified.

*: Specified operated values are valid for pulse wave voltage.

Please use at rated coil voltage. Please refer to characteristic data and set up adequate voltage in case of use at over voltage.

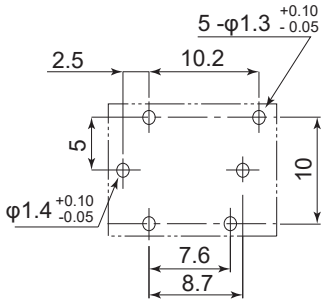
## ■ DIMENSIONS

Dimensions




PC board mounting hole layout

(BOTTOM VIEW)



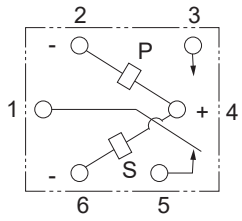

Tolerance of PC board mounting hole layout :
±0.1 unless otherwise specified.

Unit: mm
( ): Reference

Dimensions of the terminals do not include thickness of pre-soldering.

Schematics

(BOTTOM VIEW)




Schematic above is in reset condition.
Coil polarity: Please see right.

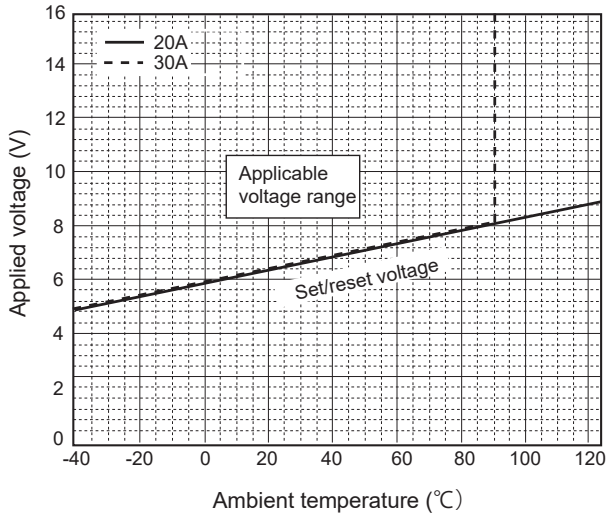
## ■ COIL POLARITY

| Terminal number | 2 | 4 | 6 |
|---|---|---|---|
| Set | - | + | |
| Reset | | + | - |

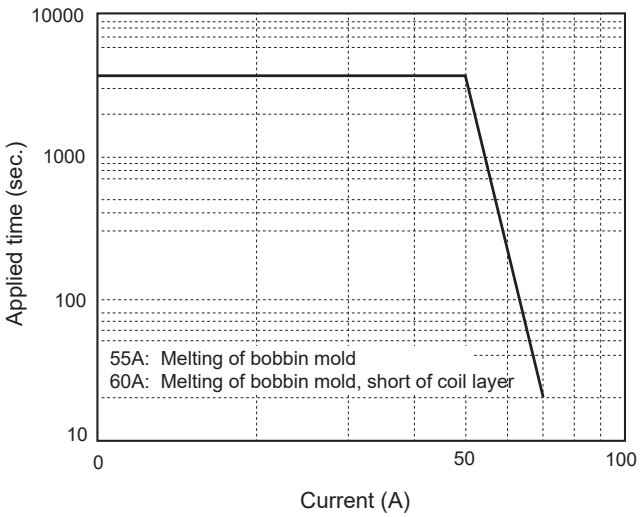
## ■ CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

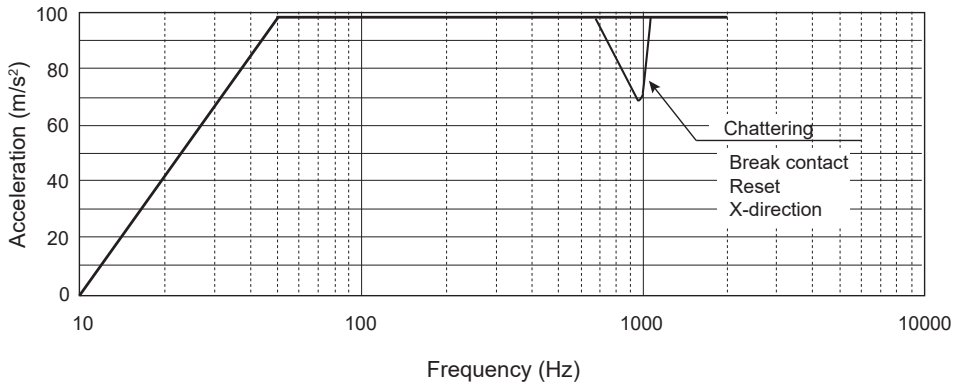
Operating range



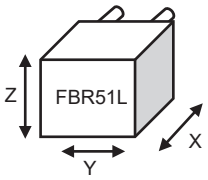

Contact current capacity



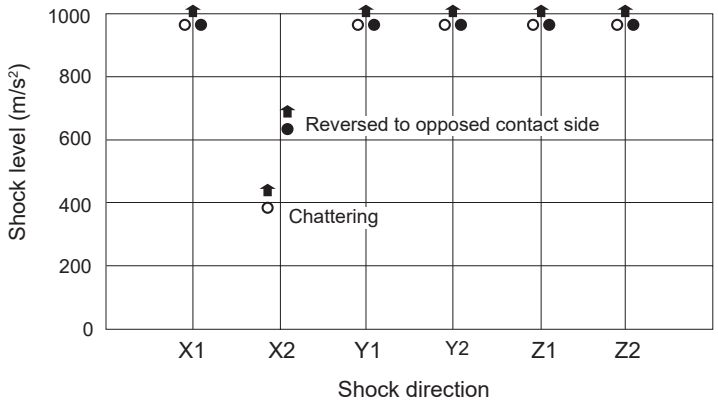

Vibration resistance characteristics



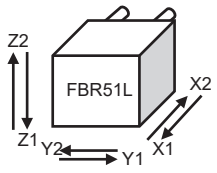

Frequency: 10 to 2000Hz
Acceleration: 98m/s² max.
Shock direction: See diagram below
Detection level: Chatter > 1ms




Shock resistance characteristics




Shock application time: 6±1ms half-sine wave
Test conditions: Coil energized and de-energized
Shock direction: See diagram below
Detection level: Chatter > 1ms




● : Reversed from reset to set
○ : Break contact (reset)
Make contact: Min. 980m/s² at all directions

# CAUTIONS

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Reflow soldering is not available with standard type.
- Do not use relays in the atmosphere with sulfide gas, chloride gas or nitric oxide. Contact resistance may increase.
- Do not use silicon or silicon-containing product or materials near relays. It may cause contact failure.

### Notes for latching relays

- Latching relays are shipped in the state set, but state may change due to shock during transportation or mounting. Before using the relays, it is advisable to bring the relays in necessary state (set or reset) and program a circuit sequence. Otherwise, it will or will not operate simultaneously with power activation.
- Please connect relay coils according to specified polarity.
- Do not apply voltage to both set coil and reset coil at a time.

# GENERAL INFORMATION

## 1. RoHS Compliance

- All relays produced by FCL Components are compliant with RoHS directive 2011/65/EU, including commission delegated directive 2015/863.

## 2. Recommended lead free solder condition

**Flow Solder Condition:**

| | |
|---|---|
| Pre-Heating: | Maximum 120˚C within 90 sec. |
| Soldering: | Dip within 5 sec. at 255°C±5°C solder bath |

Relay must be cooled by air immediately after soldering

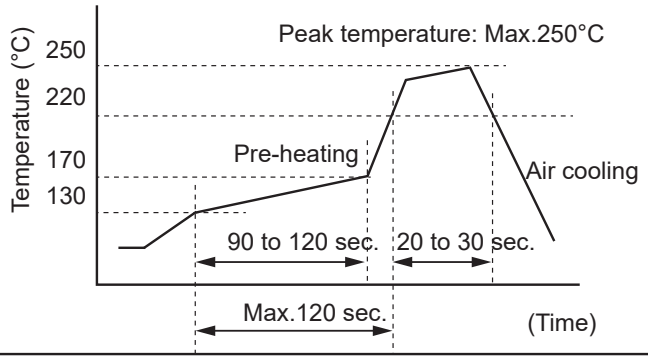
**Solder by Soldering Iron:**

| | |
|---|---|
| Soldering Iron: | 30-60W |
| Temperature: | maximum 350-360˚C |
| Duration: | maximum 3 sec. |

**Reflow Solder Condition:**

**(Applicable only for reflow capable type)**

Recommended reflow soldering profile IRS (infrared reflow soldering)




**Important notes for reflow soldering**

- Temperature shall be measured at PC board upper surface.
- Temperature at PC board upper surface may be changed depending on size of PC board, components mounted on the PC board and/or heating method. Please perform the confirmation test wtih actual PC board.
- This reflow condition is applicable only for reflow-capable relays. Do not reflow reflow-incapable relays.
- Recommended solder for assembley: Sn-3.0 Ag -0.5 Cu.

**We highly recommend that you confirm your actual solder conditions**

## 3. Moisture Sensitivity

- Moisture Sensitivity Level standard is not applicable to electromechanical relays, unless otherwise indicated.

## 4. Tin Whiskers

- Dipped SnAgCu solder is known as presenting a low risk to tin whisker development. No considerable length whisker was found by our in-house test.

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